

**1. Work requester fills out this section.**

☐ Standing Work Permit

Requester: Don Lynch	Date: 07/20/11	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 07/20/11	Est. End Date: 10/31/11
Brief Description of Work: Enter MMS to perform troubleshooting, testing and repair on MuTr detector and MuTrigger FEE's			
Building: 1008	Room: IR	Equipment: MuTr,MMS	Service Provider: PHENIX technicians and MuTr Experts

**2. WCC, Requester/Designee, Service Provider, and ESS&H (as necessary) fill out this section or attach analysis**

<b>ESS&amp;H ANALYSIS</b>				
<b>Radiation Concerns</b>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination
	<input type="checkbox"/> Radiation	<input type="checkbox"/> Other		
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer	
<b>Radiation Generating Devices:</b>	<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment
<b>Safety and Security Concerns</b>	<input type="checkbox"/> None	<input type="checkbox"/> Explosives	<input type="checkbox"/> Transport of Haz/Rad Material	
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input type="checkbox"/> Critical Lift	<input type="checkbox"/> Fumes/Mist/Dust*	<input type="checkbox"/> Magnetic Fields*	<input type="checkbox"/> Pressurized Systems
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Heat/Cold Stress	<input type="checkbox"/> Nanomaterials/particles*	<input type="checkbox"/> Railroad Work
<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Hydraulic	<input type="checkbox"/> Noise*	<input type="checkbox"/> Rigging
<input type="checkbox"/> Biohazard*	<input type="checkbox"/> Elevated Work	<input type="checkbox"/> Lasers*	<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Security Concerns
<input type="checkbox"/> Chemicals/Corrosives*	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lead*	<input type="checkbox"/> Oxygen Deficiency*	<input type="checkbox"/> Suspect/Counterfeit Items
<input checked="" type="checkbox"/> Confined Space*	<input type="checkbox"/> Ergonomics*	<input type="checkbox"/> Material Handling	<input type="checkbox"/> Penetrating Fire Walls	<input type="checkbox"/> Vacuum
* Industrial Hygiene (IH) Review Required				<input type="checkbox"/> Other
<b>Environmental Concerns</b>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Work impacts Environmental Permit No.		
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use Institutional Controls	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed	
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive	
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical	
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping	
Waste disposition by:				<input type="checkbox"/> Other
<b>Pollution Prevention (P2)/Waste Minimization Opportunity:</b>		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		
<b>FACILITY CONCERNS</b>	<input checked="" type="checkbox"/> None			
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm	<input type="checkbox"/> Vibrations	
	<input type="checkbox"/> Impacts Facility Use Agreement	<input type="checkbox"/> Temperature Change	<input type="checkbox"/> Other	
<input type="checkbox"/> Configuration Control	<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions		
<b>WORK CONTROLS</b>				
<b>Work Practices</b>				
<input type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input checked="" type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)
<input checked="" type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other
<input type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection	<input type="checkbox"/> Warning Alarm (i.e. "high level")	
<b>Personal Protective Equipment</b>				
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input type="checkbox"/> Gloves	<input type="checkbox"/> Lab Coat	<input type="checkbox"/> Safety Glasses
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator*	<input type="checkbox"/> Safety Harness
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers	<input checked="" type="checkbox"/> Safety Shoes <input type="checkbox"/> Other
<b>Permits Required</b> (Permits must be valid when job is scheduled.)				
<input type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems		
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No		
<input checked="" type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other		
<b>Dosimetry/Monitoring</b>				
<input type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input type="checkbox"/> TLD	
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization	
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O <sub>2</sub> /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input checked="" type="checkbox"/> Other Check O <sub>2</sub> level prior to entry	
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump		
<b>Training Requirements</b> (List specific training requirements)				
Confined Space, CA-Colider User, PHENIX Awareness				
<b>Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:</b>			<b>If using the permit when all hazard ratings are low, only the following need to sign: ( Although allowed, there is no need to use back of form)</b>	
<b>ESS&amp;H Risk Level:</b>	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High	WCC: _____ Date: _____
<b>Complexity Level:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Service Provider: _____ Date: _____
<b>Work Coordination:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Authorization to start _____ Date: _____
(Departmental Sup/WCC/Designee)				

### 3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

**Work Plan** (procedures, timing, equipment, and personnel availability need to be addressed):  
See attached procedure and data sheets

Special Working Conditions Required (e.g., Industrial Hygiene hold points or other monitoring)  
None

Notifications to operations and Operational Limits Requirements: None

Post Work Testing, Notification or Documentation Required: No

Job Safety Analysis Required: ☐ Yes ☐ No

Walkdown Completed (Required): ☒ Yes

**Reviewed by:** Primary Reviewer signature means that the hazards and risks that could impact ESS&H have been identified, a Walkdown was completed and the hazards will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Building Manager				
Service Provider				
Work Control Coordinator	Don Lynch		20146	
Other				
Review Done: <input type="checkbox"/> in series		<input type="checkbox"/> team		

### 4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).

Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:

Workers are encouraged to provide feedback on ESS&H concerns or on ideas for improved job work flow. Use feedback form or space below.

### 5. Department/Division Line Manager or Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name:	Signature:	Life#:	Date:
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### 6. Worker provides feedback.

**Worker Feedback** (use attached sheets as necessary)

a) WCM/WCC: Are there any changes as a result of worker feedback? ☐ Yes ☐ No

Note: See work planning and control subject area section 2.6.

**7. Post Job Review/Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor.)** The WCC ensures that the change process to update drawings, placards, postings, procedures, etc. are initiated, if necessary.

Name:	Signature:	Life#:	Date:
Comments:			

## MMS Entry During Shutdown for MuTr/MuTrigger North Troubleshooting

### INTRODUCTION

Muon Tracker Detector (MuTr) and MuTrigger experts need to access the interior of the South Muon Magnet to install/troubleshoot/test noise reduction mechanically attached capacitors to MuTr detector subsystem electronics during the 2011 maintenance summer shutdown period after the end of run 11 of the PHENIX experiment. During this period purge gas conditions (inert gases) for subsystems in the MMS will be maintained.

### MMS MuTr TTS&R (Troubleshoot, Test and Repair)

The following operations will take place the PHENIX 2011 maintenance shutdown periods.

1. For the duration shutdown during which the MMS will be entered as described herein, all PHENIX magnets will be ramped down and locked out.
2. Prior to the first maintenance period for which entry into the MMS is required, C-A Technicians shall remove the east vertical “lampshade” panel from the MMS. This effort is planned by CAD workers utilizing a CAD controlled procedure and, as such, the work planning for this effort is beyond the scope of this work permit and merely referenced herein.
3. After the lamp shade is removed, a fixed ladder for access to the inside of the MMS shall be attached appropriately to the MMS.
4. Prior to the first worker entry into the MMS, CAD safety shall be contacted to sample the internal atmosphere of the MMS. When C-A safety arrives to take the sample, the lampshade shall be off and the ladder fixed allowing the CAD safety expert access to the internal atmosphere. The safety expert shall make an O<sub>2</sub> content check of the MMS internal atmosphere and the results shall be recorded on a copy of the attached sheet.
4. The C-A confined space safety expert shall determine from the tests whether it is safe to enter the MMS for the purposes stated herein. ***In no event shall anyone enter the MMS prior to approval of the C-A confined space monitoring expert.***
4. **During the entire maintenance period in which personnel may be inside the MMS, a 100 cfm blower shall direct external air into the MMS cavity.**
5. After clearance to enter has been approved, PHENIX technicians shall enter the MMS and install steps to allow workers to access the lower section of the MMS.
6. After the steps have been installed, properly trained MuTr subsystem and MuTrigger FEE experts and/or properly trained PHENIX technicians shall sign the entry log sheet (attached) and may then enter and perform troubleshooting and operational checks. At any time when any personnel are inside of the MMS an additional watch person shall be stationed outside of the

MMS and adjacent to the hatch to monitor the well being of those engaged in work inside. The watch person shall have no other responsibilities during his watch and may not leave his post unless relieved by an equally qualified and dedicated watch person. All those inside the MMS and the watch person shall have current BNL confined safety training and shall comply with all requirements of the BNL Confined Space SBMS standards. ***This work permit, the MMS entry log, and the Confined Space Entry Certification Form shall be posted near the access hatch.***

6. During testing, HV to the MuTr detector panels may turned on and off to trouble shoot faults and test quality of the repair/test connections. Current/voltage limits on MuTr components are within allowable working limits per the PHENIX Awareness Procedure and/or properly shielded from personnel contact and do not require any additional permits.

7. After all work has been completed and no additional access to the interior MMS is required for the current maintenance shutdown period all equipment brought into the MMS shall be removed, the MMS east vertical lampshade panel re-installed, and the MMS lockout removed.

8. After all tasks covered by this work permit have been completed, all equipment brought into the MMS has been removed, the MMS access panel closed and the MMS lockout removed, this work permit shall be closed and all relevant observations and comments concerning the work performed under this work permit shall be recorded. Should additional subsequent work in the MMS be required, a new work permit shall be generated.

## CONFINED SPACE ENTRY CERTIFICATION

Location Building 1008, IR, Muon Magnet South (MMS)		Date
Department PO	Division PHENIX	
Building 1008	Area/Location/Room: IR, MMS	
Supervisor/Designee Don Lynch/J. Carter Biggs		Life # 20146/15639

### PRE-ENTRY QUESTIONS

*For each item, check "yes" or "no": If no, consult Supervisor*

	YES	NO
Is entry essential to perform work?	<input type="checkbox"/>	<input type="checkbox"/>
Have all personnel been trained in confined space entry?	<input type="checkbox"/>	<input type="checkbox"/>
Are conditions safe to remove utility-hole cover?	<input type="checkbox"/>	<input type="checkbox"/>
Has opening been guarded?	<input type="checkbox"/>	<input type="checkbox"/>
Is monitoring equipment calibrated?	<input type="checkbox"/>	<input type="checkbox"/>
Has monitoring been performed and recorded below?	<input type="checkbox"/>	<input type="checkbox"/>
Is GFCI used, if outside or in wet conditions?	<input type="checkbox"/>	<input type="checkbox"/>
Is ventilation blown into bottom of space? (If required)	<input type="checkbox"/>	<input type="checkbox"/>
Are personnel instructed to evacuate upon hazard detection?	<input type="checkbox"/>	<input type="checkbox"/>
Have all workers reviewed these entry requirements?	<input type="checkbox"/>	<input type="checkbox"/>
Radiation: If present, RWP may be required – review work with ESH Coordinator and RCD personnel. Evaluate hazards and controls.	<input type="checkbox"/> <b>Reviewed</b>	<input type="checkbox"/>

### SPACE CLASSIFICATION QUESTIONS

For each item, check box only if "yes"

	Class 2A	Class 2B	Class 2C
Engulfment Hazard Present			<input type="checkbox"/>
Entrapment Hazard Present			<input type="checkbox"/>
Electrical Systems:			
• Deenergized	<b>X</b>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized, but Guarded or not Working Hot	<input type="checkbox"/>		
Mechanical Systems:	n/a		
• Deenergized	<input type="checkbox"/>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized but Guarded or not Working Hot	<input type="checkbox"/>		
Other Energized Systems: (e.g., steam, sewage)	n/a		
• Deenergized	<input type="checkbox"/>		
• Energized and Working Hot			<input type="checkbox"/>
• Energized but Guarded or not Working Hot	<input type="checkbox"/>		
Chemical Hazards inherent in space, based upon monitoring, but controllable by Ventilating - <b>Monitor for O<sub>2</sub> prior to entry</b>	X	<input type="checkbox"/>	
Chemical Hazards inherent in space, based upon monitoring, but not controllable by ventilating	n/a		<input type="checkbox"/>
Chemical Sources, introduced into space? (e.g., welding fumes, solvents)	n/a		<input type="checkbox"/>
High Temperature/Pressure Hazard? (other than steam utility-holes)	n/a		<input type="checkbox"/>

- If ANY box in column 2C is checked, a Confined Space Permit **IS** required.
- If any box in column 2B is checked, and none in column 2C, a Confined Space Permit **IS NOT** required **BUT** continuous monitoring and ventilating **ARE** required.
- If only boxes in column 2A are checked, no additional requirements apply.

### Classification evaluation

<b>CLASSIFICATION</b>  <div style="font-size: 2em; font-weight: bold;">CLASS:2A</div>	I have completed the front and back of this Confined Space Entry Certification form and classified this space. If the confined space is classified as a 2C, I will obtain a Confined Space entry permit. If the space is Class 2B, continuous monitoring and ventilation is required and will be documented on this form.	
Supervisor/Designee:	Life #	Date:

# BNL CONFINED SPACE ENTRY CERTIFICATION

Meter:	Serial #	Calibration Date:
Day of Use Sensor Check <input type="checkbox"/> Yes <input type="checkbox"/> No		
Tested By:	BNL#:	

## MONITORING RESULTS

Tested By:		BNL Number:			
Date/ Time	Oxygen % (% O2)	Flammable Gas (% LEL)	Carbon Monoxide (CO ppm)	Hydrogen Sulfide (H2S ppm)	Other:
<b>Pre-Entry Certification test</b>					
Acceptable Reading	19.5 – 23.5 %	< 10 % of LEL	<25 ppm	<10 ppm	

## Supplemental sampling record

# CLASS 2B CONFINED SPACE ENTRY CERTIFICATION

For Class2B spaces, continuous monitoring is required.

## MONITORING RESULTS

Tested By:		BNL Number:			
Date/ Time	Oxygen % (% O2)	Flammable Gas (% LEL)	Carbon Monoxide (CO ppm)	Hydrogen Sulfide (H2S ppm)	Other:
Acceptable Reading	19.5 – 23.5 %	< 10 % of LEL	25 ppm	10 ppm	

Class 2B: Describe Method of Ventilation:

# Muon Magnet Confined Space Entry Certification Sheet

*The undersigned certify that they have taken the BNL Confined Space Training, BNL Course # **HP-OSH-016**, within the last twenty four months, and understand the hazards involved in working in the south and north muon magnets (**MMS and MMN**).*

[illegible]